

REMARKS

This is in response to the Official Action of December 7, 2004. Reconsideration of the rejection and favorable action is respectfully requested.

First, the Applicant discovered that there were numeral errors in the specification in relation to what is shown in the drawings, and the requested changes to the specification corrects those numeral errors and clarifies the language. There is no additional matter, and merely a clarification of the existing description.

Reconsideration of the rejection of the claims is requested on the basis that the references do not show the invention as described, and is now claimed in modified claims. Claims 1, 3 and 14 were rejected under 35 U.S.C. § 102(b) as anticipated by the Hayashi Patent No. 4,398,169. The Examiner indicated that Hayashi disclosed a bore 4, 5 and housing 3, pressure sensing element 38, and a resistance sensing element 6, 7, 8, 9, a mandrel 13, rigid potting material 11 and particulate material 12 in the bore 4, 5.

The Examiner has taken great liberty with the description in the Hayashi patent, first because there is no single bore in the sensor housing, but rather there are a pair of holes or bores 4 and 5, which are separated from one another by a partition 13. (See column 2, lines 56-63). There are two bores, not just one bore, and there is no mandrel, but merely some material left between the two bores that is indicated at 13. The bores are side by side, similar to the barrel of a double barrel shot gun. Not only that, the resistance element is a coiled element, as can clearly can be seen, that extends through one of the bores, loops over the end of partition 13 and then extends back through the other bore.

As far as supporting the sensing element is concerned, only particulate material is provided, except that the end 7

which loops around the partition wall 13 is held with a sealing agent 10 so that it is "tensed".

The particulate material 11 is in both the bores 4 and 5, apparently, and it certainly does not provide any support for the partition 13, but in fact, the opposite is true. The partition 13 supports the particulate material.

One has to remember that there are two bores in a central block in Hayashi with the integral partition formed from the block of material. Rather than being supported in a bore, the partition defines at least part or both of the bores. The partition is part of the outer housing or tube.

The partition is not at all similar to the mandrel of the present application, where an outer housing has a single bore, and the mandrel carrying a resistance sensing element on its outer surface is positioned in the bore and held in place with particulate material while a second portion of that rigid mandrel is held in the same bore relative to the housing by rigid potting material. The temperature sensing element and its support on the first section of the mandrel are thus essentially cantilevered from a rigid support, but yet also supported by particulate material that directly cushions the sensing element during vibration.

Thus, the Hayashi patent certainly does not anticipate claims 1 or new claims 15 or 17, which clearly define the housing that has a single bore and a unitary mandrel supporting the sensing element. It also is respectfully submitted that there can be no suggestion in the Hayashi patent that would render the claims obvious since Hayashi discloses only a pair of bores with a partition between them, and there is no rigid potting material for supporting a mandrel relative to the housing by filling the bore with the rigid potting material around a first section of the mandrel.

Claims 1, 2, 9, 12 and 13 were rejected as anticipated by the Takahashi et al. Publication No. 2002/0084884. The Examiner stated that Takahashi had a bore in a housing 60, a temperature sensing element 38, with resistance temperature sensing element 11, a mandrel 13, rigid potting material 17 and particulate material 50. However, here, again, the Examiner has asserted an interpretation of the Takahashi publication that is not within the disclosure of Takahashi. The Takahashi device shows a thermistor 11, with end electrode wires 12 and 13 protruding from the ends. This does not form a rigid mandrel that has an outer surface with the temperature sensing element supported on the outer surface and surrounding the mandrel. Further, the Examiner has indicated that there is a rigid potting material 70 and a particulate material 50. However, the arrangement does not show or suggest one section of a mandrel being supported in a rigid potting material while a second portion of the mandrel that carries the resistance sensing element is supported with particulate material in the same bore. In other words, in the Takahashi device there is an intervening metal tube called a "metal case 40", and the coagulated insulating powder that is made by mixing a powder with water to form a slurry and filled into the metal case is the only support for the thermistor and for any lead wires that are extending out. The metal case itself is supported in a heat resistant adhesive, and certainly not a rigid potting material as claimed in the present independent claims 1, 15 and 17. In short, the Takahashi device just does not have the concept of having a mandrel that fits into a single bore and which is supported relative to the bore with two different types of materials, one of which is an insulating particulate material that surrounds and cushions the sensing element, and the other of which cantilevers the first section of the mandrel because it is mounted in a rigid potting material relative to interior surfaces of the same bore.

Thus, the arrangement of the Takahashi device is a completely different concept than the present sensor.

There is no teaching in the Takahashi reference of the arrangement for cantilevering the section of a mandrel that supports the sensing element, and surrounding that sensing element with particulate material.

It is respectfully submitted that claims 1, 2 and 13, as well as independent claims 15 and 17, and their dependent claims are allowable.

Claims 1, 3 and 12 were also rejected as being anticipated by the Berger et al. reference, but again, the Berger et al. reference is an entire sensing element that is merely held in a particulate material, and the helical sensing element, as shown in Figure 4, is not supported on a mandrel at all, but is merely has its interior filled with particulate material as shown in Figure 3. The element 24 is formed into a continuous coil, that the end 29 is merely a junction to the lead wire.

Again, there is no mandrel supporting the coiled sensing element. The member 29 is not the sensing element of the Berger et al. device.

The bed 30 of particulate material in Berger et al., which is also shown at 31, is used for filling the interior of the coiled sensor as well as surrounding the exterior, and there is no teaching of a rigid potting material holding one end of the mandrel that also has a second section supporting the sensing element.

It also must be noted that the sensing element support, that is, the mandrel is not part of the resistance circuit of the temperature sensor. The mandrel serves as a support for the sensing element, but is not in the circuit, as are the elements 13 in Hayashi and 22 in Berger et al., which the Examiner stated were "mandrels". Those elements are leads and are in the resistance circuit.

In fact, there is no teaching of a rigid potting material at all in the Berger et al. patent. Thus, claims 1, 3, 12 and the new independent claims 15 and 17 are allowable.

The dependent claims are believed allowable with their parent claims. In particular, claim 6 was rejected as being obvious over Berger et al. in view of O'Connell et al. Claim 6 incorporates the features of claim 1, and is allowable therewith. Epoxy may be a known rigid potting material, but there is no suggestion of using such an epoxy material to support a mandrel for a sensing element so that the element itself is essentially cantilevered from a section of the mandrel.

The particles that are specified in claims 4, 5 and 8, in the combination provides a rugged sensor arrangement because of the rigid mounting of one section of the mandrel with the particulate material supporting and cushioning the other section.

It is respectfully submitted that claims 4, 5 and 8 are also allowable.

The features of claims 10 and 11 relate to the coefficient of thermal expansion between the housing and the mandrel, there is no teaching in Takahashi of a housing that is of a different thermal coefficient than the mandrel because Takahashi has no mandrel. The Takahashi patent merely has a thermistor with leads in it, and this does not meet the features of claims 10 and 11.

The new claims 15-19, again, are allowable for the reasons set forth in connection with claim 1 and include a mandrel assembly with a resistance temperature sensing element encircling and supported on the exterior surface of the first section of the mandrel, and with the second section of the mandrel held in a rigid potting material so that it cantilevers the first section. The dependent claims include additional features. For example, claim 16 specifies a resistance wire is wound over the outer surface of the first section of the mandrel

only, and the sensing element clearly does not extend to the second section of the mandrel that is held with the rigid potting material.

Claim 18 includes the second portion of the bore being of larger diameter than the first portion to provide an adequate area for the rigid potting material that cantilevers the section of the mandrel supporting the resistance sensing element.

Claim 19 includes the unique non-obvious feature that the particulate material is the only material between the first mandrel section and the surrounding inner surface of the bore, so that it is clear that the rigid epoxy material does not overlie or surround the temperature sensing element.

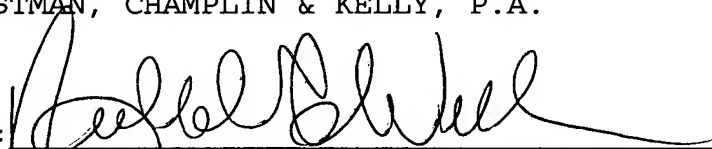
Favorable action is respectfully requested.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

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